Report on Gun-4.2 run at PITZ in 2014-2015

## Contents

|  |  |  |  |
| --- | --- | --- | --- |
| **section** | **subsection** | **section title** | **Author** |
| 0 | **0.1** | **PITZ beamline and gun-4.2 (history)** | A. Oppelt |
| 1 | 1.11.21.31.41.51.61.71.8 | **RF conditioning**RF feed system and conditioning procedureGun powerConditioning/operation with solenoidVacuum activityTypical signals of RF and interlock sensorsLong term tests 🡪 statistics on unperturbed periodsResonance temperature drift… | Y. Renier |
| 2 | **2.1****2.2****2.3** | **Dark current**History of the dark currentTypical and final dark current measurementsDark current momentum measurements | M. Krasilnikov |
| 3 | **3.1****3.2****3.3****3.4** | **Electron beam momentum**Maximum mean momentum vs. peak powerPhase scans and projections measuredHEDA2 vs. HEDA1 measurementsLPS tomography (with booster) | M. Krasilnikov |
| 4 | **4.1****4.2****4.3****4.4****4.5****4.6**4.74.84.9 | **E-beam transverse phase space: Emittance measurements**Various bunch charges experimentally optimized for 53MV/m (incl. simulations, Gauss vs. flattop)Impact of the e-beam transport53MV/m, 500pC, history and correlation to QE53MV/m vs. 60MV/m60MV/m: long vs. short GaussianBeam brightness: measured vs. simulated4nC measurements for THz studies (incl. transport)Tomography update | G. VashchenkoP. BoonpornprasertG. Kourkafas, Y. Renier |
| 5 | **5.1****5.2****5.3****5.4** | **Cathodes**History of cathode manipulationsCathode imagesQE and QE-mapsHot spot: “rotation experiment” | M. Krasilnikov |
| 6 | **6.1****6.2**6.36.4 | **RF system**LLRF system 🡪 uTCA commissioning experienceProblems with readout of gun input directional coupler (5MW 🡨🡪 10MW coupler discrepancy, termination replacement etc.)Problems (~kHz noise from modulator…?)PWM implementation | W. KoehlerM. HoffmannS. Pfeiffer |
| **7** | **7.1****7.2** | **Photocathode Laser**Status overview (OSS was not available)3D-Elli – installation, commissioning, problems, first beams | M. GroßT.Rublack, J. Good |
| 8 | 8.1**8.2****8.3** | **RF gun stability**WCS-stabilization + readout updateuTCA measurementsBeam-based measurements… | J. SchultzeM. Krasilnikov |
| 9 | 9.1**9.2****9.3** | **Investigations on imperfections**Photoemission studiesBeam imaging studiesElectron beam asymmetry studies (coupler kick, solenoid tilt, 2nd vacuum mirror, etc) – *pdf only up to now?*… | M. KrasilnikovQ. ZhaoI. Isaev |
| 10 | **10.1****10.2****10.3****10.4****10.5****10.6** | **TDS**Hardware setup and main parameters/specificationsMeasurement setup and procedureBunch profile/length measurements vs BSA and chargeLPS measurements: first tests and problemsVB measurements for THz studies (250;100;20pC)**First slice emittance measurements using TDS** … | H. HuckP. Boonpornprasert |
| **11** | **11.1****11.2****11.3****11.4****11.5** | **Plasma acceleration experiment**Intro and simulations (parameters and specs)Setup and preparingCommissioning (measuring)First testsNext steps | M. Gross |
|  |  |  |  |
|  |  |  |  |
| **Appendix 1** | **Beam loading at 4-5nC** | M. Krasilnikov |
| Appendix 2 | Gun fast recovery tests | Y. Renier (O. Hensler) |
| **Appendix 3** | **E-beam optimization for high magnetic field** | M. Krasilnikov |
| Appendix 4 | LPS studies (P. Lu –program) | G. Vashchenko |
|  |  |  |